PRICE 15¢

MAR 9 1938

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •

December 11, 1937

Wind and Weather

See Page 381

A SCIENCE SERVICE PUBLICATION

Do You Know?

In Europe zoological parks are frequently open to visitors at night.

A new product to absorb sound is a porous stone tile for lining walls and ceilings.

The world's only Museum of Biblical Botany is in Palestine at the Hebrew University.

Bats have a homing instinct, and have been known to fly 65 miles back to a favorite roost.

Cauliflower and broccoli are found to be rich in vitamin C, sometimes called the anti-scurvy vitamin.

Rayon mixed with wool to produce a cheaper fabric is harder to detect than cotton in a woolen material.

Rocks 200 miles under the earth's surface conduct electricity more freely than rocks only a few miles down.

An electric refrigerator was sold to an Eskimo, at the recent Canadian National Exhibition in Toronto.

The spruce gall aphid is a serious enemy of ornamental Norway and white spruce trees but does little damage to such trees grown for timber production.

Streamlined hogs are in fashion now, as the demand swings toward a longer, narrower animal that will yield medium cuts of meat.

Australia's merino sheep yield about three times as much wool as they did a hundred years ago.

"The most important, most all-pervading need of the young child is a feeling of security," says the Child Study Association of America.

One hundred years ago, 1837, Samuel G. Howe started his great experiment of teaching a deaf-blind child, Laura Bridgman, to communicate with others and become an educated and useful human being.

A new discovery of emeralds was made recently in northeastern Transvaal, Africa.

A flower vase should be washed clean with hot water and soap, lest bacteria that decay the stems of flowers survive in the vase.

Excavating the moat at historic Fort Marion, at St. Augustine, Florida, government archaeologists have found Indian pottery, pipes, bullets, cannon balls, ink wells, and other relics discarded and buried since the fort was built in 1672.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER *are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.*

ACOUSTICS
Why is it difficult for the automobile driver to talk to those on the rear seat? page 374.

ARCHAEOLOGY
How does marble show the traces of time? page 373.

CHEMISTRY
Why are by-products disappearing in chemical industry? page 377.

CONSERVATION
Is the use of mistletoe harmful? page 382.

ENGINEERING
How can electric light bulbs be kept from blackening? page 376.

Is the number of tubes in a radio set a safe guide for buying? page 376.

What good does it do to vibrate concrete paving before it hardens? page 373.

EXPLORATION
Where is the setting for the novel the "Lost World"? page 374.

GENETICS
Why are odorless cabbages in demand in England? page 375.

GEOLOGY
Where does oil come from? page 378.

MEDICINE
Are all streptococci killed by sulfanilamide? page 371.

Can vegetable substances cause malignant tumors? page 377.

How does Uncle Sam salvage drug addicts? page 371.

Should first aid kits be used without supervision? page 376.

What are the dangers of the new shock treatment for mental diseases? page 376.

METEOROLOGY
How hard does the wind blow on Mount Washington? page 381.

PHYSICS
How penetrating are cosmic rays? page 377.

PHYSIOLOGY
Can the vocal cords be photographed in action? page 373.

What kind of water causes thirst? page 377.

SCIENCE NEWS LETTER

Vol. 32 DECEMBER 11, 1937 *No. 870*

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 2101 Constitution Avenue, Washington, D. C. *Edited by* WATSON DAVIS.

Subscriptions—$5.00 a year; two years $7.00; 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Back numbers more than six months old, 25 cents.

Canadian subscribers please add 50 cents a year, foreign subscribers 75 cents a year for extra postage.

Members of the American Association for the Advancement of Science have privilege of subscribing to SCIENCE NEWS LETTER at the reduced price of $3 per year. Application for this privilege should be accompanied by privilege card obtained from the Permanent Secretary, A.A.A.S., Smithsonian Institution Building, Washington, D.C.

In requesting change of address, please give your old address as well as the new one, at least two weeks before change is to become effective.

Copyright, 1937, by Science Service, Inc. Republication of any portion of SCIENCE NEWS LETTER is strictly prohibited. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicate services issued by Science Service.

Cable address: Scienserve, Washington.

Entered as second class matter at the postoffice at Washington, D. C., under the act of March 3, 1879. Established in mimeographed form March 18, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Readers' Guide to Periodical Literature and in the Engineering Index.

Advertising rates on application. Member Audit Bureau of Circulations.

SCIENCE SERVICE is the Institution for the Popularization of Science organized 1921 as a non-profit corporation, with trustees nominated by the National Academy of Sciences, the National Research Council, the American Association for the Advancement of Science, the E. W. Scripps Estate and the journalistic profession.

Board of Trustees—*Honorary President:* William E. Ritter, University of California. Representing the American Association for the Advancement of Science, J. McKeen Cattell, Editor, Science, Garrison, N. Y.; Henry B. Ward, University of Illinois, Urbana, Ill.; Edwin G. Conklin, *President*, American Philosophical Society, Philadelphia, Pa. Representing the National Academy of Sciences, W. H. Howell, *Vice-President* and *Chairman of Executive Committee*, Johns Hopkins University, Baltimore, Md.; R. A. Millikan, Director, Norman Bridge Laboratory of Physics, California Institute of Technology, Pasadena, Calif.; Harlow Shapley, Director, Harvard College Observatory, Cambridge, Mass. Representing National Research Council, Ludvig Hektoen, John McCormick Institute for Infectious Diseases, Chicago, Ill.; C. G. Abbot, Secretary, Smithsonian Institution, Washington, D. C.; Harrison E. Howe, Editor of Industrial and Engineering Chemistry, Washington, D. C. Representing Journalistic Profession, John H. Finley, Editor, New York Times; Mark Sullivan, Writer, Washington, D. C.; Dean Carl W. Ackerman, Columbia University Graduate School of Journalism, New York City. Representing E. W. Scripps Estate, Harry L. Smithton, *Treasurer*, Cincinnati, Ohio; Robert P. Scripps, Scripps-Howard Newspapers, West Chester, Ohio; Warren S. Thompson, Miami University Oxford, Ohio.

Staff—Director, Watson Davis; Writers: Frank Thone, Emily C. Davis, Jane Stafford, Marjorie Van de Water, Robert Potter, Ronald L. Ives, Leonard Engel; Correspondents in principal cities and centers of research. Librarian: Minna Gill; Sales and Advertising: Hallie Jenkins, Austin Winant, Howard Bandy.

MEDICINE

New Group of Diseases Cured by Sulfanilamide

Southern Medical Association Learns of Modern Treatment for Drug Addicts; Shock Cure Studied

REPORTS of successful use of the drug, sulfanilamide, in a new group of diseases were made by Drs. Perrin H. Long and Eleanor A. Bliss of the Johns Hopkins Hospital, Baltimore, at the meeting of the Southern Medical Association at New Orleans.

First American report of the use of this powerful remedy was given by these same investigators at the meeting just a year ago of this medical organization. At that time the Baltimore scientists reported cures of erysipelas, childbed fever and other streptococcus-caused ailments with sulfanilamide treatment.

This year they reported its healing effect in the painful and generally stubborn illnesses due to infection of the urinary tract. Cases that had lasted for from five to seven years and in which all other forms of treatment had failed were cured by sulfanilamide. The drug, Dr. Long said, kills practically all of the germs which commonly infect the urinary tract.

The all important factor in treating these conditions is to obtain the proper concentration of the drug, that is, to get enough of it into the urinary tract to kill the germs. The amount necessary can be determined by laboratory tests.

Laboratory tests, also, can show whether or not sulfanilamide will cure cases of streptococcus infections, the condition for which the drug was first tried. There are many varieties of streptococci. Not all of them are susceptible to the action of the drug, research reported by Drs. Long and Bliss and their associate, W. H. Feinstone, showed.

Identification Important

Identification of the particular streptococcus that is causing illness in a particular patient is of prime importance. The Baltimore scientists told how these germs may be identified and which ones can be killed by sulfanilamide.

Group A and Group B hemolytic streptococcal infections in man can be cured by the drug. Good results have been obtained in treating group C hemolytic streptococcal infections in dogs and horses. Group D hemolytic streptococcal infections in man are unaffected by the drug. Alpha streptococcal infections, the kind found in the heart disease known as subacute bacterial endocarditis, are in general not affected by sulfanilamide treatment.

Drug Addicts Treated

Since May, 1935, some 3,000 drug addicts, most of them federal prisoners, have been admitted to the U. S. Public Health Service's hospital at Lexington, Ky. Details of the treatment of narcotic drug addiction at this institution were reported by Drs. Lawrence Kolb and W. F. Ossenfort.

The program of treatment is achieving good results, the physicians believe, although legal complications make it impossible to give an accurate estimate of results at present. The physical condition of the patients is almost always remarkably improved and their power of resisting influences that might make them revert to addiction is strengthened in the vast majority of cases.

Chief feature of the hospital's program for eradicating drug addiction is that, although most of the addicts are prisoners, they are treated as patients who are mentally ill. Discipline, when necessary, is under the direction of the psychiatrist. Another important feature is the effort made by the hospital authorities to follow the patient after his release and help him avoid relapsing into addiction again. Whenever possible, a job is found for the patient before he leaves the hospital. The social service department tries to promote a helpful attitude on the part of relatives, friends and officials. Members of the hospital staff keep up an active correspondence with former patients after their discharge.

Study Shock Cure

Patients restored to sanity by insulin or metrazol shock treatment seem to undergo during the treatment a strong temporary disruption of their brains and central nervous systems. This appears

VACUUM CLEANING

A U. S. National Institute of Health researcher, Oren G. Hefner, is vacuum-cleaning fleas from a white rat in connection with Public Health Service studies of rat-flea-borne typhus fever in the United States.

from the symptoms seen during the insulin shock and the metrazol convulsion, Dr. Lewis A. Golden of Tulane University School of Medicine told members of the Southern Medical Association.

Why the mind functions in a normal manner after this severe disturbance is unknown. Dr. Golden believes that the first step toward learning why the treatment is effective and how it works is to study and describe the bewildering array of symptoms of mental and nervous disruption that occur during the treatments.

Bedridden Helped

Successful treatment of a limited number of cases of muscle weakness disease was reported by Drs. Carlo J. Tripoli and Howard H. Beard, of Louisiana State University Medical Center and State Charity Hospital.

The treatment consisted of adding to the patient's diet one of the amino acids, which are the building blocks of proteins such as meat. No cures were achieved but some of the patients, so weakened by the muscle disease they had been bedridden, recovered enough to lead active lives and to be classed as "almost normal."

The treatment must be continued for an indefinite period, if not for life, the physicians believe. No patient maintained his improvement when treatment was stopped. Early diagnosis and prompt beginning of treatment were also stressed as important. Patients suffering from 12 different types of muscular weakness or disability, including infantile paralysis and paralysis following ginger jake poisoning, were given the treatment. The infantile paralysis and ginger jake patients were not helped, but those suffering from myasthenia gravis and muscular dystrophy were.

Adding amino acetic acid to the diet increased the appetite and weight of most underweight persons, the study revealed.

Stomach As Guide

Acidity of the stomach contents may mean indigestion or it may mean that disease is present somewhere else in the body than the stomach. How a study of stomach function can help in diagnosing other ailments besides stomach complaints was explained by Dr. Frank L. Apperly of the Medical College of Virginia at Richmond.

Changes in the acidity of the stomach contents may occur in perfectly healthy people although these changes do often come with indigestion. These changes in acidity are usually just the mirror of certain chemical changes in the blood, Dr. Apperly found from experiments conducted both in Richmond and in his laboratory at Melbourne, Australia.

Anything that lowers the amount of bicarbonate in the blood lowers the acidity of the stomach contents. The reverse is also true. Blood bicarbonate and stomach acidity may be lowered by overbreathing, anemia, high altitudes, fevers, chronic nephritis, diabetic acidosis and pregnancy. The blood bicarbonate and stomach acidity may be lowered by certain chronic heart and lung diseases and by taking alkalies and by insulin.

Vitamin Lack

Lack of appetite, discomfort after eating and many other common symptoms of digestive disorder may also be the early signs of disorders due to a diet that lacks vitamins, Dr. J. H. Musser of the Tulane University School of Medicine pointed out.

In scurvy, pellagra and beriberi, diseases caused by not eating enough vitamins, digestive disorder symptoms are outstanding, although in severe cases they may be overshadowed by other symptoms. Early in these and other diseases of vitamin lack, the digestive symptoms may be the chief signs of illness.

The digestive disorder symptoms are of most importance in cases of chronic vitamin deficiency, in which the patient may for long periods live on a diet that is low but not altogether lacking in vitamins. Such a patient might never show the characteristic signs of severe scurvy or beriberi, but would have the digestive disorders.

Dr. Musser listed pregnant women, nursing mothers, growing children, patients with hyperthyroidism, fevers and wasting diseases, persons who diet and those who have food allergies or idiosyncrasies as among those who eat the bare minimum of vitamins required, but never get the optimum amount and who consequently suffer chronic vitamin deficiency and complain of various digestive disorders.

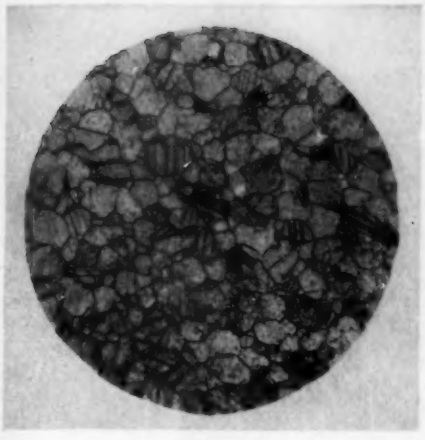
Dramatic improvement in the condition of such patients is sometimes obtained, Dr. Musser reported, by putting them on a diet containing much roughage and therefore plentiful vitamins, even though such a diet might seem wrong for a person with digestive disorders.

Science News Letter, December 11, 1937

The sky around the planet Mars is believed to be much darker than our pale sky, in fact, an indigo shade.

GENUINE

A nine-year-old cloud of suspicion was cleared from this art treasure by careful scientific tests. The crystalline structure of the marble was examined and evidence of time and weathering attested to its age.



CARRARA

This pattern of crystals as seen through the microscope provided evidence that a suspected art treasure is no fraud.

ARCHAEOLOGY

Italian Tomb Cleared of Being Fraud After 9 Years

AN ITALIAN marble tomb, long suspected by critics of being an art fake palmed off on America, has been proved an authentic treasure, after nine years of scientific testing.

At the Boston Museum of Fine Arts, where the tomb aroused such violent controversy that it was removed from public exhibition, the case is settled.

Reporting its verdict, the Museum calls the tomb a fifteenth century monument of Tuscan workmanship, later restored in minor ways. A beautiful figure of a woman lying with folded hands is a feature of the monument.

Scientific tests included making paper-thin slices of samples from all fourteen pieces of marble in the tomb. These samples were studied under the microscope and compared with similar samples of known kinds of marble. This test, like that of human finger prints, is considered unmistakable. The tomb is of two kinds of marble, the famous Carrara marble and some from Olympia. Chisel marks were also examined by microscope, and ultraviolet tests were made.

The crystalline structure of the marble's surface was also studied, because scientists have learned that old marbles "breathe," that is, take in and give out air. In long years, this process leaves evidence in dark bands on the marble surface, visible through the microscope. This evidence of time and weathering was found on all parts of the tomb except where a new inscription was added, and a few restorations made.

Science News Letter, December 11, 1937

PHYSIOLOGY

Ultra-Speed Movies Capture Vibrations of Vocal Cords

Taken at Rate of 4,000 Frames Per Second With Special Lighting Show Speech at Its Origin

HIGH SPEED motion pictures of the little known vibrations of the human vocal cords, taken at the rate of 4,000 frames a second, were exhibited for the first time publicly at the meetings of the Acoustical Society of America in Ann Arbor, Mich.

The fundamental experiments in the origin of human speech have significance in solving that old, but basic, question of whether it is the cords or the shape of the mouth which predominate in determining speech characteristics.

Engineers D. Herriot and D. W. Farnsworth of the Bell Telephone Laboratories constructed the ingenious experimental arrangement which made possible these pioneer physiological pictures.

The method was to insert, far back in the mouth, a small dental mirror and by it and other mirrors to reflect an intense beam of light on the vocal cords. Light reflected by the cords came back out of the mouth, then through a small hole in one of the mirrors and finally into the special high-speed camera.

So fast is this camera, and so short the exposures for each frame, that it is useless for ordinary photography even out in bright sunlight. A large 2,000 watt bulb overloaded to gain greater brilliance was the light source employed.

Shining and glistening are the saliva-covered cords as they oscillate in speech. Their undulations start from the bottom as they close; then progress upward and finally and suddenly they open again to repeat the process.

Finally the subject, Mr. Farnsworth in this pioneer case, pauses for breath, the cords relax and the opening of the glottis enlarges as he inhales.

Interest of the telephone engineers in the work centers around potential improvements in equipment, for basic knowledge of human speech leads to the design of better apparatus. For the same reason the pictures should have significance for radio and sound motion pictures.

So new are the high speed speech movies that physicians have not yet seen them but they are believed to be of great interest to physiologists and anatomists.

Science News Letter, December 11, 1937

ENGINEERING

Vibrating Concrete Paving Increases Its Strength

SHAKING a concrete road into place, a novel method of road building developed only a short time ago, results in a stronger road with the same amount of material or enables considerable savings of cement, according to the experiences of highway engineers, reported before the Highway Research Board's annual meeting in Washington, D. C.

Giving a road the "shimmies" with a vibrator before the mixture has set enabled Illinois road builders to cut down on the amount of water mixed in with cement and obtain a firmer road as a result, V. L. Glover of the Illinois Department of Public Works informed his colleagues.

A second experiment in which the vibrator was used with a standard cement-water mixture resulted in a road that was 10 per cent. stronger than the ordinary type, he asserted.

The higher the frequency of the vibrator, R. D. Finney, Kansas State Highway Department engineer, declared, the more efficient it is.

A novel freezing-and-thawing test to show how different road-building materials will stand up under extremes of weather conditions was described by Prof. C. H. Scholer of Kansas State College. Since a given weight of ice occupies more space than the same amount of water, water seeping into a rock and

freezing will crack the rock. Prof. Scholer, by his testing method, imitates this condition to see how much of that type of strain a given material can stand.

Beautiful Highways

America's 15,000,000 pleasure-bound drivers, and the 9,000,000 others who make their living on the road, deserve and need highways that are safe and relaxing, it was stated generally at the session of the Joint Committee on Roadside Development.

Telephone poles, unsightly ditches, narrow shoulders, bare slopes attacked by erosion that endangers the road itself were all thoroughly criticized by leading highway engineers from every part of the United States.

Pointing to a photographic exhibition of the type of work that has been done and to what can be further done, H. J. Neale, chairman of the Joint Committee, asserted that these modern streamlined highways will prove cheaper in the long run.

"I don't know whether they will be 20 per cent. or 80 per cent. cheaper because we haven't got suitable figures yet," he declared, "but highways whose sides and shoulders are properly designed cost considerably less for maintenance once the road is built."

Wide shoulders—to allow cars to park well off the road and to remove the hazard represented by the ditch; wayside rests,—to allow the fatigued driver a chance to relax; slopes planted with grass and shrubs,—to prevent erosion from carrying earth and rocks down on to a road cut through a hillock or to prevent erosion from under-cutting the bed of a road raised above the countryside, were among the things urged on the Board by speakers.

Science News Letter, December 11, 1937

EXPLORATION

Expedition Ready to Secure Specimens From "Lost World"

Unscaled 8,000-Foot Peak Is On Eroded Plateau Of Which Mt. Roraima, Famed by Doyle, Is Also Part

ALMOST ready to poise their airplane for the takeoff, members of the Phelps Venezuelan Expedition at Ciudad Bolivar are whipping equipment into shape for a journey to a "Lost World" not yet on any map, it was reported by the American Museum of Natural History.

Dr. George H. H. Tate and his colleagues will leave from Cuidad Bolivar shortly to scale Mt. Auyantepuy, a "Lost World" discovered only a short while ago by an air-minded prospector flying over the country. The expedition is financed by William H. Phelps of Caracas and sponsored by the American Museum of Natural History.

Situated deep in the Orinoco jungle, one of the least explored regions of the world, Mt. Auyantepuy is a large remnant left when the table-land of which it was once a part was eroded away. The mountain is 8,000 feet high and 300 square miles in area. Two similar mountains, Mt. Duida to the west and Mt. Roraima to the east, were also parts of the same plateau. They were visited by Museum expeditions in 1928 and 1929.

Dr. Tate and his colleagues will bring back specimens of bird and mammal life as well as map the region they are visiting. They plan to reach the base of Mt. Auyantepuy by airplane. The air journey will take two hours as against the two months a similar journey through the jungle would require.

Dr. Tate was a member of the two previous expeditions to the region. Accompanying him this time are William F. Coultas, for years in charge of the Whitney Expedition in the South Pacific; and E. Thomas Gilliard and James A. Dillon of the Museum staff. Mr. Phelps will also accompany the party.

Many new species of bird life were found on Mts. Duida and Roraima and similar forms are expected to be found on the newly found table-land. Mt. Roraima is famous as the original of the late Sir Arthur Conan Doyle's "Lost World."

The table-land is situated near the point at which Venezuela, Brazil and British Guiana come together, in a particularly inaccessible part of South America, much of which still remains to be explored.

Science News Letter, December 11, 1937

ACOUSTICS

Easier To Talk to Driver Than for Him to Talk Back

THE OLD quips about backseat driving have a strong basis of scientific reality, it was disclosed at the meeting of the Acoustical Society of America.

Studies of the relation between automobile noise and speech intelligibility show that it takes ten times the intensity of speech sounds to carry intelligible conversation back to the backseat occupant than it does for the latter to talk to the hapless driver in front.

Dr. J. C. Steinberg and W. A. Munson of the Bell Telephone Laboratories, New York City, disclosed the studies. Scientists of Electrical Research Products, Inc., made the measurements from which the conclusions were drawn.

Three positions of two occupants in a car were investigated. When seated side by side in front intelligible conversation could be carried on at all speeds up to 60 miles an hour with little trouble. An increase of sound intensity of only two decibels was needed and this can be obtained by raising the voice.

In the test of conversation from backseat driver to the driver, no shouting was needed until 50 miles an hour was reached. Then a two decibel increase was required. At 60 miles an hour a six decibel rise was needed.

However, for the same position of car occupants but for conversation from the front seat to the back it was necessary to raise the voice to 18 decibels to obtain intelligible conversation at 60-mile-an-hour speeds.

Thus the backseat driver has a 12 decibel sound advantage in swift-flying conversations.

Actually what happens (as most people know without knowing why) is that the driver in front soon gives up attempts to carry on this conversation. The point is that a sound intensity of 16 decibels is almost at the limit of human ability to maintain intelligible conversation. Twenty decibels is the limit.

A single word can be shouted, said Dr. Steinberg, with an intensity of 30 decibels and some opera singers can attain an intensity of 40 decibels for a sustained note. But for intelligible conversation 20 decibels is the maximum.

Science News Letter, December 11, 1937

Developing a Longfellow-Evangeline State Park, in Louisiana, historians have delved into customs and home life of the Acadians, who were immortalized in the poem of Evangeline.

ODORLESS CABBAGE

Cornell Early Savoy Cabbages, growing on the grounds of Thomas Madsen, New York City seedsman. Uncursed with the usual cabbage odor, they promise to make "corned-beef-and-" painless in apartments—and the Tortoise House in the London Zoo fitter for human beings to breathe in.

GENETICS

Tortoises Like Cabbage But Britons Don't Like Odor

TORTOISES crave cabbage; Britons object to odor; Cornell to the rescue.

No, that isn't a cryptic code message out of a mystery thriller. It's a plain statement of facts, boiled down.

It all started with the development of a cabbage minus customary cabbage odor, by Prof. C. H. Myers of the department of plant breeding at Cornell University. That was a couple of years ago. Something got into the papers about it.

Over in England a noted zoologist saw the news item. He is Prof. Julian S. Huxley, descendant of Darwin's famous friend and champion. Prof. Huxley is secretary of the Zoological Society of London.

He had a problem on his hands. In his zoo is a Tortoise House. Tortoises like cabbage. Cabbage is good for them. Cabbage, therefore, they get to eat.

But it is warm in the Tortoise House. It has to be, to keep the cold-blooded denizens lively and contented. And in the warm atmosphere the pieces of cabbage left lying around ferment and develop a most powerful "breath." Visitors to the zoo naturally don't like that.

Prof. Huxley wrote to Science Service, to trace the story of the odorless cabbages, hoping that here might be a way to give the tortoises their favorite dainty and yet spare the noses of discriminating Britons. Science Service in turn wrote to Prof. Myers, who supplied desired information:

The new odorless kind of cabbage has a name now. It is called Cornell Early Savoy. It is described as "uniformly well crinkled, dark green foliage; heads of medium size, light green in color, semi-pointed, very crisp and succulent. Exceptionally fine for cooking." If tortoises can't respond to *that*, there's no gratitude in the chelonian heart.

The small original stock of seed was shipped to Denmark for multiplication. Denmark is the heart of the original home of the whole cabbage tribe, and is still the best place for launching new strains of cabbage on their career. Now there are a couple of American seedsmen who have Cornell Early Savoy seed ready for the market. During the past summer small crops of it were raised in several places in upstate New York, where the heads found a ready market.

And next year, most likely, the tortoises in London's Tortoise House will have their rations of the new cabbage and Britons with noses safe from outrage will be on hand to watch them chew.

Science News Letter, December 11, 193

BIOGRAPHY

Story of "Royal Family" Of Science—The Curies

THE FASCINATING tale of a "royal family" of science, the Curies, marches through the pages of a new book. (MADAME CURIE, A BIOGRAPHY—Eve Curie, translated by Vincent Sheean —*Doubleday, Doran,* 393 p., illus., $3.50)

The Curies, who have won three Nobel Prizes in science in two generations, furnish more than enough material for a biography by any author. When that author is a member of the family, as is Eve Curie, the wealth of intimate and accurate information is unsurpassed.

While the book relates the life of Marie Curie, who rose from obscurity in Poland to become better known than any living scientist, the Curie family traces and retraces its footsteps through the pages. There is Pierre, scholarly husband of Marie—and her scientific idol—who guided her in their early years of research in isolating radium and who, with her, was a winner of the Nobel Prize in 1903. Pierre's tragic death in an accident in 1906 left Marie with two young children: Eve, the author of the book, and her sister, Irene, who, in 1935 also won the Nobel Prize with her husband Frederick Joliot.

Couple these two awards with Marie Curie's second winning of the Nobel Prize, in 1911, (the only person twice honored) and one has a family which rightly can be called "royal" in an intellectual sense.

The excellent translation of Vincent Sheean has done much to make "Madame Curie" as outstanding a book in English as it is in the original French. The book was published simultaneously in England, France, Italy, Spain and the other nations of Europe.

Science News Letter, December 11, 1937

MEDICINE

Warns Against Haphazard Use of First Aid Kits

WARNING that unsupervised use of first aid kits in industrial plants may do more harm than good was issued by Dr. M. N. Newquist of Chicago at the meeting of the American College of Surgeons in Chicago. He also declared that industrial organizations should, as far as possible, use hospitals already established in their communities for treatment of injuries to employes, rather than set up their own hospitals within the industrial plant.

"The use of first aid kits in extremely decentralized industrial operations may be necessary," he said, "but their unsupervised use in industrial establishments as a whole should not be permitted.

"Fewer, and more centralized, first aid stations or dispensaries are desirable in order to insure adequate treatment and records.

"Industrialists will find that in the long run they can obtain more efficient hospital service at less cost from organizations whose sole purpose is to conduct hospitals than they could by establishing their own hospitals."

A plea for more and better facilities for training industrial surgeons was made by Dr. Frederic A. Besley of Waukegan, Ill. As president of the American College of Surgeons, he pledged its support to efforts to create greater opportunities and facilities for the teaching of industrial medicine and surgery in medical schools and hospitals.

Science News Letter, December 11, 1937

ARCHAEOLOGY

Long-Eared Asses Took Early Fighters To War

PICTURE a soldier 5,000 years ago jogging to battle in a one-passenger chariot pulled by four long-eared asses!

We think of ancient warriors tearing into the fray in horse-drawn chariots, with all the wild abandon of a Ben Hur. But here we must imagine them advancing at a donkey's trot, and perhaps stalled by the road, if some balky beast decided not to go to war that day.

Evidence that asses were used this way has been unearthed at Tell Agrab, where the Oriental Institute of the University of Chicago has been excavating. The evidence is a tiny, copper chariot pulled by four asses. It is only three inches high but so realistic that archaeologists can learn from it new facts about man's very early efforts to travel on wheels.

The chariot takes us back to the time when Sumerians were leaders of civilization in the Tigris-Euphrates valley, before Babylonians and Assyrians trod opposition powers in the dust and forged great empires.

The model shows a Sumerian driver balancing himself in his one-man car by aid of a foot rest and by gripping a kind of center board with his knees. A yoke holds the collars of the inner pair of steeds. The two outer animals are kept in line only by a link with the collars of their neighbors. The reins are attached to rings in the asses' upper lips.

Most remarkable are the two wheels. They are wooden disks with copper studs around the rim, apparently for grip. Here—5,000 years old—is a forerunner of the modern tire.

The little metal donkeys themselves are historic evidence. Archaeologists have been uncertain as to how early Mesopotamia's cities acquired the plodding ass and the faster horse for travel. The tiny chariot proves that asses definitely were used in the early Sumerian dynastic period.

Science News Letter, December 11, 1937

ENGINEERING

Radio Buyers Defrauded By Dummy Tubes in Sets

EIGHT dummy tubes in a 14-tube radio receiver make it look big, but they do not improve its operation, Dr. Orestes H. Caldwell, former radio commissioner, reports in *Radio Today*.

Purchasing one of these 14-tube receivers, which resembles a popular make of radio, Dr. Caldwell's staff analyzed it, and found its performance to be about one eighth as good as a legitimate 14-tube set, and not quite as good as that of a standard five-tube receiver. Eight of the tubes, each consisting of a filament in a glass bulb, were connected in series across the line, serving no good purpose in the receiver and wasting power. Lamp bulbs would be just as useful in the same locations.

Popular belief that the number of tubes in a radio receiver is a measure of the radio's performance, comments Dr. Caldwell, is responsible for the success of this fraud, which can only be guarded against by purchasing standard types of equipment from reputable dealers.

Science News Letter, December 11, 1937

IN SCIENCE

ENGINEERING

Screen in Electric Light Prevents Blackening of Bulb

AN electric light which, its inventor claims, will not blacken during its lifetime of use, is covered by a patent just granted by the U. S. Patent Office.

A built-in screen to prevent vaporized metal from the filament from reaching the inner glass surface of the bulb features the invention, patented by Richard E. Smith of East Cleveland, Ohio, and assigned by him to the General Electric Co.

Blackening of the bulb surface, which cuts down on the amount of light given out by the bulb, is considerable, particularly in the gas-filled type in general use. The surface becomes blackened through the fact that molecules of the metal filament, heated to incandescence by the electric current, are carried by convection currents in the gas until they are deposited on the relatively cold glass surface.

The screen does not materially interfere with convection currents, Inventor Smith declares in the specifications accompanying the patent, No. 2,100,879, but the vaporized particles are deposited on it instead of on the glass.

Science News Letter, December 11, 1937

MATHEMATICS

20 Years of Calculations On Sun, All Correct

FOR 20 years Dr. E. W. Brown, now Yale professor emeritus of mathematics, has calculated laboriously by long-hand the influence of the sun on the moon, a task that compares in complexity with "a chess problem in three dimensions, played blindfolded."

Joyfully he was able to assure the American Philosophical Society that these two decades of important astronomical calculation were "done without an error."

Dr. Brown, assisted by Dr. W. J. Eckert, by using adapted commercial calculating machines, has checked in one year's time the original calculations and proved them correct.

Science News Letter, December 11, 1937

ENE FIELDS

CHEMISTRY

"Byproducts" Becoming Obsolete Word in Chemistry

THE OLD definition of the word by-product, as applied by the chemical industry, is now growing obsolete. Products, once virtually wastes, are finding ever-widening use. All too often, chemists are discovering, the byproduct of a chemical process may outstrip the "parent" product in importance.

Chemical companies making caustic soda by the electrolysis of salt solution obtain chlorine and hydrogen as byproducts. If the demand for caustic soda lessens as it has done occasionally, and the demand for chlorine and hydrogen increases—as it is now doing—then the caustic soda might rightly be considered a byproduct.

Because of this and other examples the chemical industry now defines a byproduct only as something for which a full use has not been developed.

In industry's world true byproducts are few and becoming fewer, notes the Magazine *Fortune* (Dec.), in a comprehensive article tracing the growth of modern chemical industries.

Science News Letter, December 11, 1937

GEOGRAPHY

China's Great Wall Is Problem in Geography

WHY ancient China built her Great Wall—that twisting dragon of a wall, 1,500 miles across the north—is a problem for geographers.

They see more in China's stony guardian than a military defense. As a wartime barrier the wall was ineffective, though thousands of Chinese were worked to death to build it. One jester summed up the result: The Chinese never got over it; but the Tartars did.

Some Chinese have accounted for their Great Wall as a powerful stone dragon built to keep evil spirits out. But geographers, probing into ancient China's political and social problems, are beginning to look upon the Great Wall as a geographic affair.

In a report to the Geographical Review, Owen Lattimore, geographer, points out that the Chinese were great wall builders long before the day of the Great Wall. In feudal days, when China was still made of separate states, fifth to third centuries B. C., these states built walls against one another as well as against the northern barbarians.

So, when Emperor Huang Ti formed the states into an empire, the idea of rigid boundaries was familiar, and all China was driven to concentrate on marking the empire's northern line.

This was done, it appears, to keep undesirables out and to keep desirables in. The wall marked plainly the northern limit beyond which the empire did not wish to spread. This separating sheep from goats was highly desirable for civilized China. Tribes in Manchuria, Mongolia and Central Asia were uncouth, and their life in forest, desert, or plain was far different from China's intensive farming economy.

But the Great Wall, Mr. Lattimore explains, was never more than a vague boundary. There was pressure and pull in a wide border region. Barbarians would become partly Chinese, and frontier Chinese would drift into anti-Chinese traits. The balance of power in many of China's struggles has rested with betwixts-and-betweens, in zones spreading out from the Great Wall.

Science News Letter, December 11, 1937

MEDICINE

Cancer in Rats Caused by Feeding Wheat Germ Oil

A CERTAIN kind of cancer or malignant tumor has been produced in some 100 albino rats by feeding them crude wheat germ oil made by ether extraction, Drs. L. G. Rowntree, Arthur Steinberg, William R. Brown, George M. Dorrance and E. F. Ciccone of the Philadelphia Institute for Medical Research reported at the meeting of the American Philosophical Society.

This is the first time that a product of vegetable origin has been found guilty of causing a malignant tumor. The finding, however, does not necessarily mean that wheat germ or any other article of diet is a cause of cancer. But since materials of this class have never before been implicated in cancer causation, a new field of investigation is opened.

"An exhaustive study seems desirable," Dr. Rowntree said, "to determine the relation of certain cereal products to tumors resulting from their use."

Science News Letter, December 11, 1937

PHYSIOLOGY

Heavy Water Causes Thirst By Exosmosis of Cells

EXPLANATION for the thirst caused by drinking heavy water (water formed with double-weight hydrogen instead of the ordinary single-weight kind) is offered by Prof. S. C. Brooks of the University of California (*Science*, Nov. 26).

In a series of experiments with large cells of the water plant, Nitella, Prof. Brooks showed that heavy water causes a shrinkage of the cells, due to exosmosis, or the pulling of ordinary water out of them. Replaced in ordinary water, the cells swelled up again to original volume.

Since the sensation of thirst is a signal of loss of water from cells in the body, effects similar to those observed with the plant cells apparently take place when an animal or a human being drinks heavy water and becomes unbearably thirsty.

Science News Letter, December 11, 1937

PHYSICS

Mysterious Cosmic Rays Pierce 1600 Feet of Rock

SCIENTISTS studying the still-mysterious and piercing cosmic rays which continually strike the earth and everything on it, from the depths of outer space, are adventurers. They have climbed rugged mountain peaks, carried their instruments high into the stratosphere in balloons, sailed the seven seas and sunk their equipment deep in lakes.

Now, it is disclosed at the meetings of the American Physical Society in Chicago they have donned miners' crash-helmets and carried their delicate measuring apparatus into deep mines.

V. C. Wilson of the University of Chicago reported to the physicists' meeting his experiments carried out in a mine in Michigan to a depth of 1600 feet.

At this great depth the intensity of the cosmic radiation was only one twenty-thousandth of that at the surface of the earth. So deep was the penetration that electrons and photons fail to account for the observations although they predominate in the earth's atmosphere.

It is believed these experiments provide evidence that the new-found "heavy" electron, or else the much-mentioned but yet undiscovered neutrino, is the causative agent of the piercing rays.

Science News Letter, December 11, 1937

GEOLOGY

Where Does Oil Come From?

Before It Reaches the Tank of Your Automobile, It Must Be Found and Taken From the Reservoir Rock

By DR. PARKER D. TRASK

Associate Geologist, U. S. Geological Survey; Director, American Petroleum Institute Research Project on source beds of petroleum.

WHEN the gas in your tank begins to get low you hunt for a filling station. Usually you don't have to hunt very long, and if you have the price, your worries are all over until you have gone another 150 miles or so. But how about the oil company that sells you the gasoline—where does it get its gas? Does it have any worries when its supplies run low? Everybody knows that gasoline is made from oil that came out of wells, but how about these wells—how long do they last?

Unfortunately, oil wells don't last very long. After ten or fifteen years they usually don't produce so much oil. Then the oil company has to find new wells, which means locating new oil fields, because when an oil field is discovered, all the wells that can profitably be drilled on it are brought in as fast as possible.

Finding new oil fields costs a lot of money. Oil just isn't found everywhere. Most parts of the United States have produced no oil and offer little promise of ever producing any oil. Even in regions where oil is present, the oil is found in scattered places called fields or pools. Why should oil be so spotty? The answer is that it forms under very special conditions.

Three Essentials

Three things are necessary in order for an oil pool to form. First, there must be something present—source beds—to make the oil. Second, there must be some sort of a container—reservoir—to hold the oil after it has been generated. Third, there has to be a trap—structure—to prevent the oil from escaping, once it has collected in the reservoir.

Since oil is found in the ground, the three things needed for it to accumulate in commercial quantity have to be in the rocks beneath the surface. The substances that make the oil—the source materials—are in shales, sandstones, and limestones; the containers or reservoirs for the oil are sandstones and limestones; and the traps or structures are arrangements of the rock strata in such a way that the oil can not escape.

Strata containing oil-forming substances are similar to the sandstones and shales at the surface, but are buried at some depth. Sandstone and shale are composed of fine particles of sand and silt that have been carried by streams and have settled at the mouths of the streams at the bottom of some quiet body of water, such as a bay or lagoon. Most rivers are muddy, but the oceans are clear. The sediment carried in suspension by streams disappears after the water reaches the sea. The only place for this sediment to go is down to the bottom, so along the coast line the sediment brought down by rivers is dumped in bays and lagoons or close to shore in the ocean. Year after year the rivers carry sediment and drop it when they reach the sea. The sediment deposited last year is buried by the sediment brought down this year, and that in turn by the sediment supplied next year, and so on for countless ages. In this way the bays and lagoons and even the sea near the shore are filled with sediment. If the land sinks as the sediment is supplied, several thousand feet of sandy and silty material may accumulate.

Turn to Rock

In the course of time, the sediments consolidate and change to hard rock. The sand becomes cemented together and forms sandstones and the silts and muds are compacted to form shales. The substances that make oil are deposited in the sediments along with the sand and silt particles and become a part of the rock.

Oil collects in minute droplets, widely distributed through the sands and shales. Before the oil can be recovered at a profit, it must gather into relatively large quantities. Very rarely does oil accumulate in an actual pool underground. Instead, it saturates a porous rock bed.

Ordinarily, oil collects in sandstone. Sandstone is composed of grains of sand cemented together. The cement usually does not fill in all the space between the sand grains, and the oil gathers in the open spaces between the grains. The process is analogous to filling a glass with bird shot. After the glass has been filled with shot, considerable water can be poured into it. In fact, the amount of water that can be poured in is more than one-fourth the capacity of the glass.

Similarly, if a gallon pail is completely filled with birdshot, it will still hold a quart of water without overflowing. Grains of sand are roughly rounded, and although they are not as spherical as birdshot, the vacant space between them is about one quarter of the volume of the space enclosing them. Whether the rounded objects are cannon-balls or pansy seed, the space left vacant between them is always about one quarter of space occupied, as long as all the spheres packed are of the same size. As some of the space between the sand grains in a sandstone is filled with cement, the vacant space is never more than one quarter the volume of the rock, and may be much less. Ordinarily, the pore space

CRUDE OIL TO GASOLINE

Crude oil will not run the ordinary automobile. Parts of it are distilled off for motor fuel, then the oil is destructively distilled, "cracked", to give more gasoline. This tower, photographed by Socony-Vacuum Oil Co., makes possible still greater recovery of gasoline from the crude oil.

is from one tenth to one fifth the volume of the rock. If all the pores in a rock are filled with oil, a cubic foot of rock would hold from one tenth to one fifth of a cubic foot of oil, and it would take from twenty-five to fifty cubic feet of rock to hold a barrel of oil.

Oil can also accumulate in limestones. Water percolating through limestone may dissolve some of the limestone, leaving cavities. These cavities may act as suitable reservoirs and later become filled with oil.

Traps

Oil moves freely through the pore spaces of a reservoir rock, and unless a trap is present, it will not accumulate in commercially-valuable quantities. Wherever oil is formed, with a very few exceptions, water is present, going through all the pore spaces. If both oil and water occupy the open spaces in a reservoir rock, the oil, being lighter than water, rises to the top.

If the pore spaces in the rock are continuous to the surface of the ground, the oil passes upward through the water until it reaches the surface, where it may escape. In order for the oil to accumulate in sufficient quantity to make an oil pool, it has to be caught in a trap where it can not escape. These traps are called structures and are what the oil prospector tries to find while searching for oil. The commonest type of trap is the anticline.

An anticline is the arch formed when a series of rock strata have been folded. Oil is found in many such arches. If the rock layers overlying a sandstone consist of shale that has no pore spaces, oil that accumulates in the sandstones can not escape upward through the shale that lies above it.

If such an impervious shale overlies a sandstone in an anticline, any oil in the sandstone passes upward through the water until it reaches the overyling shale and then rises up the flank of the anticline immediately beneath the shale until the top of the arch is reached, where it can go no higher. There at the crest it meets oil particles that have moved upward from the other side of the anticline. The oil thus is trapped at the top of the arch and as more and more oil rises up the flanks, the quantity of oil at the crest increases until it forms a pool in the solid rock.

Salt Domes

The anticline is only one of several types of traps. Another kind is the salt dome. Salt domes are found in several places along the Gulf Coast of Texas and Louisiana. Salt Domes are formed when a mass of salt hundreds or thousands of feet in diameter shoves its way upward from the depths toward the surface. As the salt rises through the rock strata, it bends them upward and breaks some of them off. Oil enclosed in porous sandstones between impermeable shales rises up the inclined strata until it reaches the salt, which it can not penetrate. As a result, the oil is trapped against the salt and gradually enough accumulates to form an oil pool.

Source Beds

The main thing in the accumulation of oil is to have something to make the oil. If there are no substances in the ground that can generate oil, no oil field will form. Not much is known about these mother substances of oil except that some sandstones, shales, and limestones contain them, other sandstones, shale and limestones do not. It is very advantageous to an oil company in trying to find a new oil field to know how plentiful source materials of oil are in the area it is considering prospecting. Dry holes cost a lot of money. Formerly it cost only a few thousand dollars to drill an exploratory well for oil, but now $50,000 is a common figure, and as much as $500,000 has been spent on some wells. Hence, if no oil is found in a well, a lot of money has been wasted.

If the people who explore for oil could know in advance that there was no possible source beds of oil in the area they had in mind, they could save much money by not drilling. Or if, after drilling one well, they could tell from the rock cuttings that there was nothing in the ground to make oil, they would be saved the expense of drilling additional wells. On the other hand, if they could ascertain from the cuttings that good source materials were present, they would be encouraged to do further drilling in the hope of finding an adequate trap or structure.

Good Region

In areas such as the Gulf Coast of Texas, oil has been found over such a widespread area that a person drilling for oil is reasonably certain that if he can locate an adequate trap—a salt dome—he has a good chance of finding oil. Favorable source material seems to be present under most of that region. But when he tries to extend the limits of known producing territory toward Mississippi, Alabama, Georgia, and Florida,

AN OIL FIELD

This California oil field shows the great concentration of wells on a productive area over a structure. When a structure is found, every owner drills his leased area immediately, for the oil migrates, and unless the leased area is put into immediate production, other wells will take all the oil from beneath it.

TEAPOT ROCK

This rock, from which Teapot Dome Oil Field took its name, is a mass of sandstone and shale, capped with a thick layer of sandstone. These sandstones and shales are similar to those which produce and contain oil at some depth below the surface. Photo by William H. Jackson

where little oil or gas has been found, he is by no means certain that even in a suitable structure or trap he will find oil.

Knowledge of source material is especially worthwhile to companies exploring in foreign lands. Such companies commonly are given concessions to prospect in a large region with the privilege of selecting some small part of the general area for development of oil. Often the selection of the particular areas for development has to be made within a certain time limit, before extensive drilling to test the areas can be completed. Knowledge of source beds would be especially helpful in such a case. The company then could be much more certain that they would be likely to find oil in the areas they had chosen than if they had proceeded according to present conditions of inadequate knowledge of source beds.

In the United States more than $50,000,000 a year is spent on dry holes—on wells that yield no oil. Except for the information obtained from these wells this money is wasted. Many of these dry wells are drilled in areas where little or no source material for oil is present. If we just knew what areas were deficient in source material, the petroleum industry could be saved millions of dollars.

The main problem is to find a way of recognizing source beds of oil. The problem is attacked in just the same way as a detective tries to solve a mystery. Clues have to be found and followed until they lead to the successful unravelling of the mystery. Each clue eliminates some of the possibilities that originally had to be considered, and as clue after clue is found, the possible solutions become fewer and fewer until only one—the right answer—is left.

Our first clue is that we know oil comes from certain types of sandstones, shales, and limestones, but these types of rocks, though all derived from material deposited in some body of water, can form under so many different conditions that thousands of samples have to be studied in order to be sure that any particular substance in a sediment really is an oil-forming substance.

The rocks in which oil is found are now many millions of years old. The mother substances of oil they contain have undergone changes while the rocks have lain in the ground. The source materials may have been almost completely destroyed during the process of generation of oil and the things left may have very little to do with the formation of oil. Therefore, in order to tell whether a rock is a source bed, it may be necessary to find things which themselves perhaps cannot yield oil, but yet which indicate that the rock once contained substances that could yield oil.

Examine Sediments

In order to study these changes in the possible mother substance of oil, it is necessary to examine the sediments now being deposited along the present coast line. We have reason to believe that the things now accumulating on the sea bottom are similar to the things that were laid down in the ocean millions of years ago. The first study undertaken was of the sediments now being deposited along present sea coasts.

The conditions under which oil is found today make it apparent that mother substances of oil are commonly laid down close to shore. So many oil fields are located so near the shore at the time the sediments were deposited that nearness to the present coast was a good clue to use in trying to unravel this mystery of oil.

Petroleum consists of substances that contain carbon. Carbon is one of the 90-odd chemical elements of which the earth is composed, and is the element most necessary to life. In fact, except for the carbon dioxide in the air we breathe and in the mineral carbonates in limestone, the main source of carbon is the tissues of plants and animals. Another clue in our mystery, therefore, is that petroleum must come from carbon compounds that are derived from the remains of plants and animals.

The next problem, then, is how the remains of these plants and animals got into the rocks. The answer is that they were deposited in the sediments along with the silt and clay brought down by the streams.

The main source of the carbon compounds in the sediments was found to be small microscopic plants that live by the billions and trillions in the surface water of the ocean. These small plants are eaten by animals in the sea, but these animals, just like any other animals, cannot digest everything they eat, so they excrete parts of the original plant material as indigestible residues. Most of these ultimately sink to the sea bottom and become buried in the sedi-

Books

SCIENCE NEWS LETTER will obtain for you any American book or magazine in print. Send check or money order to cover regular retail price ($5 if price is unknown, change to be remitted) and we will pay postage in the United States. When publications are free, send 10c for handling.

Address Book Department

SCIENCE NEWS LETTER
2101 Constitution Ave. Washington, D. C.

ments. Some of the plants are attacked by germs, or bacteria as they are technically called, and the parts of the plants the germs can not destroy likewise sink to the sea bottom, where, together with all the other organic matter (carbon compounds) that have accumulated in the sediments, they are attacked by yet other animals and germs, and still more indigestible residues are formed. It is from these unusable residues that oil is generated.

Oil is not formed in soft sediments. No trace of petroleum is found in sediments now being deposited. A considerable time after the sediments accumulate, perhaps millions of years afterward, chemical changes take place which transform the bacterial excrements into oil. Today, oil chemists believe that only certain of these undigested residues can be transformed into oil.

Studies of more than 30,000 samples of rock, mostly from drill-cuttings, have shown geologists that a complex chemical property of the rock, called the nitrogen-reduction ratio, is a valuable clue to its oil possibilities. While not an infallible clue, the presence of a high nitrogen-reduction ratio is a good indication of no oil, while a low ratio indicates a good possibility of oil production from a suitable trap in the rock layer.

The nitrogen-reduction ratio is the best known clue to the oil possibilities of a rock. It does not work for every sediment, just as radium will not cure every cancer, but the "batting average" of the nitrogen-reduction ratio test is high. Like radium in the cure of cancer, the nitrogen-reduction ratio offers promise in the finding of oil, but further research will be necessary on both radium and the nitrogen reduction ratio before their full possibilities become useful.

This article was edited from manuscript prepared by Science Service for use in illustrated newspaper magazines. Copyright, 1937, by Every-Week Magazine and Science Service.

Science News Letter, December 11, 1937

Many peoples of the world have used gourds as bottles and dippers.

●RADIO

December 16, 4:15 p. m., E.S.T.

WIVES BY THE DOZEN—IN AFRICA—Rev. Edward Ward of the Catholic University of America.

December 23, 4:15 p. m., E.S.T.

THE CHRISTMAS STAR—James Stokley of the Franklin Institute.

In the Science Service series of radio discussions led by Watson Davis, Director, over the Columbia Broadcasting System.

METEOROLOGY

New Observatory Can Stand 200-Mile-an-Hour Winds

By DR. CHARLES F. BROOKS

Professor of Meteorology, Harvard University; Director, Blue Hill Observatory

See Front Cover

AFTER five years in the stage office of the Mount Washington Auto Road Company, the famous weather observatory on the summit of this stormy mountain has just moved into a building of its own.

By direction of Col. Henry N. Teague, president of the Mount Washington Railway Co., an extraordinarily sturdy building has been constructed. People who have ridden on the cog railroad have noted the size of the timbers making up the trestle on Jacob's Ladder and elsewhere—9 x 10 inches and 24 feet long. These same timbers when replaced have been cut to 22 feet and mortised for the framework of the new building.

It is probably safe to say that nowhere in the United States is a frame building of more solid construction to be found.

The Observatory wants to take no chances of being blown away if another 200 mile-an-hour wind comes along! In such a wind in April, 1934, the Stage Office danced about as much as its heavy chains would permit, and its walls now and then bellowsed in and out. The pressure inside the building varied between gusts by 0.2 inches on the barometer. This is the equivalent of a change of pressure of a ton on the surface of the building in the course of a few seconds.

Mt. Washington, highest peak in the northeastern United States and therefore a mecca for summer tourists and hikers, has had many buildings erected on its summit during the course of the last century. Everyone of the old-timers with the exception of Tip-Top House burned down in the great fire of 1908. Two of them blew down. Today most of the buildings atop the peak are chained down.

The basal frame of the new building is fastened to ten long bolts that extend downward at least five feet into rock or huge blocks of concrete poured in holes among the rocks. The corners of this frame are bound with heavy diagonal steel rods.

The frame consists of twelve big uprights suitably connected by horizontal timbers at the level of the second floor and all braced by 6 x 6's. The rafters are 3 x 8's closely spaced. It is obvious that if the building is to blow away it will have to go as a unit and take a chunk of the mountain top with it.

The windows for the Observatory are of double plate glass presented by the Pittsburgh Plate Glass Company, which will have a chance to prove their strength and insulating qualities under the severe conditions experienced on the mountain in winter. Several of the window units are fitted with thermocouples.

The building is now completed except for minor inside work. It has for walls one layer of shingles much overlapped, two layers of boarding, two layers of paper, one layer of Cabot quilting (a gift of a warm-hearted friend), and one layer of fireproof wallboard. It is not anticipated that much wind will come through this!

Heat is supplied from a hot-air furnace, and water from a 2,500-gallon tank inside the building, filled with water from the Base Station by the pump of the Mt. Washington Club. Before spring, water obtained from melting rime will probably be more palatable than the tank water.

The building is to be rented from the cog railway company by the corporation which has been formed to operate the observatory building. The corporation aims to "make, summarize and report scientific observations, chiefly geophysical, in the vicinity of Mt. Washington, New Hampshire; to conduct radio studies on Mt. Washington; and to further public safety and public appreciation of scientific work on Mt. Washington."

The U. S. Weather Bureau will continue to maintain half of the personnel of the observatory and a portion of the instrumental equipment as well, while the Blue Hill Observatory of Harvard University will direct the scientific activities and supply such special apparatus as may be needed.

The financial support of the observatory, outside of the Weather Bureau's participation, is chiefly from the state of New Hampshire, which has appropriated $1,500 toward expenses this year; various interested organizations and in-

STRONG

This close-up shows the special construction designed to stand against strong winds.

dividuals, and a few commercial firms.

The breadth of popular interest is evident from the fact that while mostly residents of New England, the members are spread all over the United States. Dr. J. Bjerknes of Norway and Dr. J. Jaumotte of Belgium, famous for their upper air studies, are honorary members. Two hundred annual members at one dollar each are already enrolled in the corporation. In this respect the organization resembles the Sonnblick Society in Austria which, with a world-wide membership, continues to operate an observatory on the summit of Sonnblick at 10,170 feet.

Special investigations which are planned at Mount Washington for the immediate future, all of them in continuation of previous studies of the same phenomena here, are experiments with floating balloons to mark the vertical motions and turbulences of the wind as it passes over the summit; development of a more efficient means of obtaining a continuous record of wind direction and velocity than the internally heated anemometer and wind-vane on a summit where ice so frequently forms; studies of the rate of deposition of ice on an experimental airplane wing under different conditions of humidity, cloud density and wind velocity; the times of arrival of fronts in comparison with those in surrounding lowlands; the more accurate measurements of the precipitation on this windy summit; and variations in ultra-high-frequency radio transmission between the summit, Blue Hill and other points in relation to the stratification of the air.

Science News Letter, December 11, 1937

CONSERVATION

NATURE RAMBLINGS

by Frank Thone

Pass the Greens!

NOTHING would seem less of a menace to our forests and soil than the purchase of a few yards of ground-pine garlanding, or wreaths of native holly, to make the house gayer as Yuletide approaches. Yet care must be exercised in the use of even these minor products of the woods, for over-zealous market collectors have wrought real devastation in areas tributary to our larger cities.

Holly of course is not a major element in our American forests. It grows fairly freely in the deciduous woodlands of the eastern part of the country, except in the northern areas where winters are too severe. It is mainly a small tree of the under-story, though specimens growing in the open may reach a height of forty feet or more. Its timber uses are very limited; its chief value is esthetic.

For that very reason, however, it should be spared. We are taking to the woods more and more for our recreation, and it would be a sad pity if any integral part of them should be torn out and dragged to town to die after brief use. The Wild Flower Preservation Society recommends purchase of English holly instead of the duller-leaved, sparser-berried American species. English holly is grown in this country now, so buying it encourages legitimate growers at the same time that it saves the native holly in the wild.

For the fine, prickly-leaved stuff we call ground pine, there is no imported or cultivated substitute. So if you insist on ground-pine garlands the gatherers for market will have to go out into the forests and strip the soil, exposing it to erosion and upsetting the ecological balance generally. Better to step out of the market for living garlands altogether, and use some of the bright, attractive manufactured substitutes abundantly available nowadays.

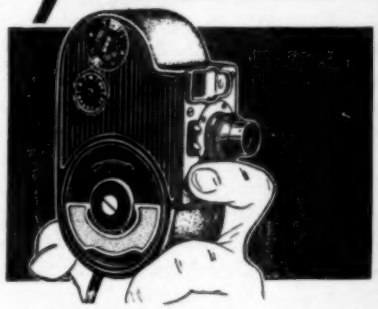
One kind of Christmas greens you can use, however, with never a frown from conservationists. Mistletoe. This Yuletide ally of Cupid is no asset to any forest it grows in, for it is a parasite on the trees and when too abundant can do considerable harm. So foresters are always willing to see it removed. It is only a nuisance to them, and they are glad to know that elsewhere it can be a subject of festivity.

Science News Letter, December 11, 1937

A bronze statue of Admiral Peary, in polar costume, was unveiled near his birthplace in Cresson, Pennsylvania, this year.

THE GIFT OF A THOUSAND THRILLS

Filmo MOVIE CAMERA



A thrill to receive . . . a new thrill every time it is used to record happy times for reliving. All this you give with this palm-size Filmo Movie Camera. Built with the same precision as the finest Bell & Howell professional equipment Hollywood demands. Simple . . . anyone can take fine color or black-and-white movies because *what you see, you get.* Uses inexpensive 8 millimeter film, reducing the cost of movies to still-picture level. Has fine anastigmatic F 3.5 lens for indoor as well as outdoor movies.

$55 AS LITTLE AS $11 DOWN

PAUL L. BRAND

Distributor of
Scientific Instruments
1808 EYE STREET, N. W.
Washington, D. C.

CONSUMERS UNION

Announces

Have there been any improvements in cars this year of importance to consumers?

What changes in gearshifting mechanisms have been made and of what importance are they?

Are the 1938 cars more economical to operate than the 1937 cars?

What changes in tuning have been made on the 1938 radios and how desirable are they? What other changes have been made and how important are they?

These and many similar questions are answered in the reports described below.

reports on 1938 AUTOS *and* 1938 RADIOS

Also in the current issue:

Electric Shavers

Will electric shavers give as close or as satisfactory a shave as ordinary safety razors? Do they irritate more or less? Are they worth the high price? Nine brands ranging in price from $7.50 to $17.50 were subjected to use tests and engineering examination and rated as "Best Buys," "Also Acceptable," and "Not Acceptable." Those who look forward to a shaver's paradise with an electric shaver should read this report before buying.

Cigars

No amount of cellophane, Xmas seals and red ribbons can disguise a bad cigar. This report, which rates 20 brands (including White Owl, Robert Burns, Cremo and Phillies) should be particularly welcomed by cigar-giving CU members.

Toys

No gift can cause the giver more anxiety than toys. At what age should electric trains be given? What kinds of toys do children get the most enjoyment and the most value out of and at what ages? Which types of toys should be avoided? Three reports in this issue answer these questions. The first, based on the recommendations of a director of a widely-known nursery school, tells which toys should be given to children between the ages of two to six; the second rates toy chemistry sets, and the third discusses dolls.

Lipsticks

More than 40 brands are rated in this report. Stains caused by some of these brands would not wash out in tests. Many brands were grossly over-priced—one brand showing a mark-up of 5000% over the cost of the ingredients. Another caused marked irritation. Several ten cent brands were rated "Best Buys."

Life Insurance

The second of a series of reports on life insurance—the first of which described briefly how the life insurance business operates. This report analyzes life insurance premiums. Next month's installment will give specific recommendations on types of contracts.

Baked Beans, etc.

Other reports in this issue give valuable buying advice on baked beans, canned salmon and electric toothbrushes.

Coming!

Reports on cigarettes, coffee, shoes, razor blades and other products. Also a series on housing and building materials.

To make sure of receiving the reports described above fill in and mail the coupon at the right.

AUTOS Prices are up approximately 10% making technical guidance in buying more necessary than ever. A preliminary technical appraisal of the 1938 models by Consumers Union's automotive consultants appearing in the current (December) issue of *Consumers Union Reports* gives a summary of the important changes on each of more than 25 models (including the Ford, Chevrolet, Buick and Packard). The significance of each change is indicated. Trailers are also discussed. Read this report before buying *any* car! It will give you a basis for making a wise selection. A later issue will carry ratings of the 1938 cars *by name* as "Best Buys," "Also Acceptable," and "Not Acceptable."

RADIOS Prices are up in this field, too. In nearly every brand the buyer must pay more this year than he did last year for a radio capable of any given level of performance. A report, based on performance tests for such factors as tone quality, ability to get stations without interference, ability to pick up weak stations with satisfactory volume, general mechanical excellence, etc., rates the leading 1938 models as "Best Buys," "Also Acceptable," and "Not Acceptable." Five communications-type receivers for advanced amateurs are also compared.

OTHER REPORTS in the December issue are described in the column at the left. To receive a copy of this issue fill in and mail the coupon below. The membership fee of $3 will bring you 12 issues of the *Reports* and without extra charge, the 1937 240-page Consumers Union Annual Buying Guide which gives brand recommendations on over 1,000 products. You can start your membership with the current issue or with any of the previous issues listed below.

WHAT CONSUMERS UNION IS—Consumers Union of United States is a non-profit, membership organization established to conduct research and tests on consumer goods and to provide consumers with information which will permit them to buy their food, clothing, household supplies and other products most intelligently. Tests are conducted by expert staff technicians with the help of over 200 consultants in university, government and private laboratories. In most cases, comparisons of the quality of products are given in terms of brand names with ratings as "Best Buys," "Also Acceptable," and "Not Acceptable." Information is also given on the labor conditions under which products are made. The sound, constructive advice on buying contained in *Consumers Union Reports* can help keep expenses down at the present time when living costs are going up.

Some of the Subjects Covered in Past Issues of the Reports

MAY—Trailers, Washing Machines, Moth Preventives, Constipation.

JUNE—Non-miniature Cameras, Radio Tubes, Sanitary Napkins.

JULY—Miniature Cameras, Gasolines, Golf Balls, Motor Oils.

AUG.-SEPT. — Refrigerators, Films, Ice Cream, Inner Tubes.

OCT.—Oil Burners and Coal Stokers, Breakfast Cereals, Auto Radios.

NOV.—Life Insurance, Portable Typewriters, Men's Hats, Anti-Freezers.

CONSUMERS UNION
OF UNITED STATES, INC.
55 Vandam Street,
New York City

Send me **CONSUMERS UNION REPORTS** for one year (12 issues) starting with the _____ issue. I enclose $3 for membership, $2.50 of which is for subscription. I agree to keep confidential all material sent to me which is so designated.

*Name*_____

*Street*_____

*City*_____ *State*_____ (L-12)

•First Glances at New Books

Geography

THE MATTHEWS-NORTHRUP NEW INTERNATIONAL ATLAS AND ILLUSTRATED GAZETTEER — *Blue Ribbon Books,* 264 p., $2.49. Maps are up to date, well laid out, cleanly printed; the text is concise and enlivened with appropriate line illustrations, as are also the statistical graphs; there are 90 five-column pages in the gazetteer. All round, a most satisfactory general atlas.

Science News Letter, December 11, 1937

Economics

REGIONAL PLANNING. PART V: RED RIVER OF THE NORTH — National Resources Committee—*Govt. Print. Off.,* 80 p., 25 c. Special problems of a river valley that is one of the richest agricultural provinces of the country but which also has its own difficulties; with recommendations on what to do about it all.

Science News Letter, December 11, 1937

Natural History, Juvenile

THE FIND OUT BOOK, Vol. 2—Comp. under the direction of Mary Watson Hyman—*Univ. of North Carolina,* 157 p., $1. Straight facts about animals and plants, simply and attractively told for the youngest group of readers, and enlivened with very nice colored illustrations.

Science News Letter, December 11, 1937

Ornithology

CROOKED-BILL: THE LIFE OF A QUAIL —I. H. Johnston—*Dorrance,* 179 p., illus., $2. A somewhat personalized biography of a quail in the West Virginia bird country.

Science News Letter, December 11, 1937

Geography

NORTH TO THE RIME-RINGED SUN: AN ALASKAN JOURNEY—Isobel W. Hutchison—*Hillman-Curl,* 262 p., $2.50. This lengthy narrative account of a woman's travels in search of botanical specimens in the Arctic leaves no doubt as to her ability as a botanist.

Science News Letter, December 11, 1937

Chemistry

POLYMERIZATION AND ITS APPLICATIONS IN THE FIELDS OF RUBBER, SYNTHETIC RESINS, AND PETROLEUM—Robert E. Burk, Howard E. Thompson, Archie J. Weith and Ira Williams—*Reinhold Pub. Corp.,* 312 p., $7.50. An American Chemical Society monograph relating to the very fundamental process of making big molecules out of the little ones or vice versa while maintaining similar percentage compositions of the elements used. Polymerization plays an essential role in making synthetic resins, synthetic rubber, processing petroleum, and a thousand other chemical products.

Science News Letter, December 11, 1937

Biography

MEMORIAL BOOK TO ROBERT EDWIN PEARY—Mercedes Buck—*Published by author, 421 Keystone Avenue, Cresson, Pa.,* 45 p., $1. Part I consists of a greatly condensed biography of Admiral Peary, Part II is an account of honors and memorials to him.

Science News Letter, December 11, 1937

Biology

BIOLOGY—Frederick L. Fitzpatrick and Ralph E. Horton—*Houghton Mifflin,* 658 p., illus., $1.75. A standard-type text, arranged in seven sections or units, each of which undertakes to develop understanding of one of the fundamental life processes.

Science News Letter, December 11, 1937

Invention

THE STORY OF DISCOVERY AND INVENTION — Ralph Henry Curt — *Hillman-Curl,* 568 p., $1.50. An illustrated history of the world's most important inventions, considered topically from early days to the present, with the emphasis, of course, on the latter.

Science News Letter, December 11, 1937

Botany

THE GENUS BIDENS. PART I, 346 p., $3.50; PART II, 362 p., $4.—Earl Edward Sherff—*Field Museum.* A monograph for which systematic botanists, particularly students of the compositae, have been waiting for a long time. The correctness of Sherff's work, and the care with which his illustrations are prepared, need no comment.

Science News Letter, December 11, 1937

Archaeology

AMERICA'S YESTERDAY — F. Martin Brown—*Lippincott,* 319 p., $3.50. Popular lectures given by Mr. Brown at Colorado College, have been shaped into a book for the layman on Mayas and other Indians who gave America its aboriginal types of civilization. The book provides a good general introduction to American archaeology.

Science News Letter, December 11, 1937

Botany

STUDIES OF AMERICAN PLANTS—VII—Paul C. Standley—*Field Museum,* 69 p., 50 c.

Science News Letter, December 11, 1937

Agriculture

CROP MANAGEMENT AND SOIL CONSERVATION—Joseph F. Cox and Lyman E. Jackson—*Wiley,* 610 p., illus., $2.75. A book of the new day in agriculture, its problems and its possibilities. Agriculture, especially in its economic and soil-conservational aspects, is seen as a national as well as an individual undertaking. Newest practices, like terracing and contour cultivation, and some of the newer soil-conservation crops like lespedeza and kudzu receive deserved emphasis. A useful appendix gives varietal recommendations by states.

Science News Letter, December 11, 1937

Conservation

SOIL EROSION CONTROL (Rev.)—Austin Earle Burges—*Turner E. Smith & Co.,* 221 p., $2.75. A mine of information on erosion control written in language that can be understood by the average man. Technical accuracy has been maintained throughout, and illustrations of erosion control methods in use add to the value of this work.

Science News Letter, December 11, 1937

Forestry

FOREST PROTECTION—Ralph C. Hawley—*Wiley,* 262 p., $2.75. Forests have many dangers and enemies to face: storm and avalanche, insects and larger animals, and above all, fire. This book goes into considerable detail in the description of each and in the discussion of economically practicable methods for meeting and conquering them. A most practical treatise for either the student or the working forester.

Science News Letter, December 11, 1937

Entomology

RECENT ADVANCES IN ENTOMOLOGY (2d ed.)—A. D. Imms—*Blakiston's,* 431 p., $5. A great deal of change has taken place in entomological knowledge and practice since the publication of the first edition of this book, so that its reappearance in revised form is most timely.

Science News Letter, December 11, 1937

Forestry

TIMBER PRODUCTS AND INDUSTRIES—Nelson Courtlandt Brown—*Wiley,* 316 p., $3.50. A highly practical work, adapted for either text or reference use, outlining methods and means for the harvesting, conversion and marketing of materials other than lumber, including naval stores and other derivatives and extractives.

Science News Letter, December 11, 1937